MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

PES 0024 – ESSENTIAL STATISTICS

(All sections / Groups)

14 MARCH 2018
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of SIX **printed** pages excluding cover page.
2. Attempt **ALL** FOUR questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.
4. **Formula** is provided at the back of the question paper.
5. **Books for Statistical Tables** is provided.

Question 1 (25 marks)

(a) The following data give the monthly rental (in thousands of dollars) for selected unit in ABC Apartment.

21 30 15 12 36 26 25 19

Assuming that these are sample data, calculate the following (leave your results correct to 2 decimal places, where appropriate):

(i) Mean **(2 marks)**

(ii) Median **(3 marks)**

(iii) Mode **(2 marks)**

(iv) Standard Deviation **(5 marks)**

(v) Range **(2 marks)**

(b) The data below is the selling price for books published by MBC.

40 37 25 37 27 28 22 24 33 27

34 22 28 21 22 29 35 26 24 38

(i) Construct a frequency distribution table for these data using four classes (21-25, 26-30, 31-35, 36-40). Then determine the percentage frequency distribution together with the cumulative frequency for each class. Include a row for total. **(6 marks)**

(ii) Interpret the percent frequency for class with age 31-35 using the table in (i). **(2 marks)**

(iii) Interpret the cumulative percent frequency for class with age 31-35 using the table in (i). **(2 marks)**

(iv) State the type of data collected by the MBC Company **(1 mark)**

Continued...

Question 2 (25 marks)

(a) The owner of a XYZ Western Food was interested in knowing the ordering pattern of his customers. The table below shows whether burger was ordered by different gender.

Burger	Gender		
Ordered	Male	Female	Total
Yes	123	226	349
No	156	195	351
Total	279	421	700

What is the probability that a customer making order at the table:

(i) will order a burger? **(2 marks)**

(ii) will not order a burger and the customer is a male? **(2 marks)**

(iii) will order a burger, given that the customer is a female? **(3 marks)**

(iv) Using appropriate answers from the previous parts to justify whether ordering burger and gender are statistically independent. **(3 marks)**

(b) The proportion of people who respond to a certain mail-order solicitation is a continuous random variable X that has the density function

$$f(x)=\begin{cases}\dfrac{2(x+2)}{5}, & 0<x<1\\ 0, & \text{otherwise}\end{cases}$$

(i) Show that the function *f(x)* is a valid probability function. **(4 marks)**

(ii) Find the probability that more than $\frac{1}{5}$ but fewer than $\frac{1}{2}$ of the people contacted will respond to this type of solicitation. **(4 marks)**

(iii) Calculate the standard deviation of *f(x)*. **(7 marks)**

Continued...

Question 3 (25 marks)

(a) Because of the relatively high interest rates, most consumers attempt to pay off their credit card bills promptly. However, this is not always possible. An analysis of the amount of interest paid monthly by a bank's Visa cardholders reveals that the amount is normally distributed with a mean of \$27 and a standard deviation of \$7. What proportion of the bank's Visa cardholders pay:

(i) less than \$15 interest? **(4 marks)**
(ii) at most \$30 interest? **(4 marks)**
(iii) between \$25 and \$35? **(5 marks)**

(b) Using the Binomial probability table, find the following probabilities.

(i) $P(X = 2)$ for $n = 5$ and $p = 0.75$ **(1 mark)**
(ii) $P(X = 0)$ for $n = 5$ and $p = 0.20$ **(1 mark)**
(iii) The leading brand of dishwasher detergent has a 30% market share. A sample of 20 dishwasher detergent customers was taken. What is the probability that at most 2 customers chose the leading brand? **(3 marks)**
(iv) The probability that a randomly chosen sales prospect will make a purchase is 0.20. If a sales representative calls on five prospects, what is the probability of the salesperson will make four or more sales? **(3 marks)**

(c) An experiment indicates that the number of α (alpha) particles that reach a small screen during an 8-minute interval has an average of 3. Determine the probability that, during an 8-minute interval, the number, Y, of α particles that reach the screen is :
(i) Exactly 4? **(2 marks)**
(ii) At most one? **(2 marks)**

Question 4 (25 marks)

(a) Sasha's Company sells online clothing. The company has good reputation in responding to the orders. The standard deviation for the time taken to send products was 14 hours. A sample of 100 orders showed that the mean time taken to send products for these orders was 65 hours.
(i) What is the point estimate of the mean time taken to send products for all orders received by the company? **(1 mark)**

(ii) Construct a 95% confidence interval estimate for the mean time taken to send products for all orders received by the company. Interpret the answer. **(6 marks)**

Continued...

(iii) Without any further calculation, comment regarding the width of the interval of part (ii) if the sample size were to increase to 200. Justify your answer.

(3 marks)

(b) Suppose that the population of interest consists of the five group of players in a pop quiz, who we will call A,B,C,D, and E. Table below lists the players and their scores.

Player	Scores
A	3
B	2
C	1
D	4
E	1

List all the possible samples of three selected players (without replacement) from this population and construct the sampling distribution of the sample mean. **(15 marks)**

End of Page

Formula Sheet

Descriptive Statistics

		Population	Sample
Ungrouped Data			
Mean		$\mu = \frac{\sum x}{N}$	$\bar{x} = \frac{\sum x}{n}$
Variance		$\sigma^2 = \frac{\sum (x-\mu)^2}{N}$	$s^2 = \frac{\sum (x-\bar{x})^2}{n-1}$
	OR	$\sigma^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{N}}{N}$	$s^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}$
Standard Deviation		$\sigma = \sqrt{\sigma^2}$	$s = \sqrt{s^2}$
Grouped data			
Mean		$\mu = \frac{\sum fm}{N}$	$\bar{x} = \frac{\sum fm}{n}$
Variance		$\sigma^2 = \frac{\sum f(m-\mu)^2}{N}$	$s^2 = \frac{\sum f(m-\bar{x})^2}{n-1}$
	OR	$\sigma^2 = \frac{\sum fm^2 - \frac{(\sum fm)^2}{N}}{N}$	
		$s^2 = \frac{\sum fm^2 - \frac{(\sum fm)^2}{n}}{n-1}$	
Standard Deviation		$\sigma = \sqrt{\sigma^2}$	$s = \sqrt{s^2}$
Median		$\frac{(n+1)^{th}}{2}$ observation of data	

Probability Distributions

Discrete

Binomial Distribution $\mu = np$ $\sigma = \sqrt{npq}$

Continuous

Normal Distribution $z = \frac{x - \mu}{\sigma}$

Sampling Distributions

Mean $\mu_{\bar{x}} = \mu$

Standard Deviation $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

Estimation

Confidence Interval $\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

Random Variables	**Mean**	**Variance**
Discrete	$\sum x \cdot p(x)$	$\sum x^2 \cdot p(x) - \mu^2$
Continuous	$\int_{\infty}^{-\infty} x \cdot f(x)dx$	$\int_{\infty}^{-\infty} x^2 \cdot f(x)dx - \mu^2$